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CONTENTS

PAGE
Embryonic Panicles in Arctostaphylos, *Willis Linn Jepson* ... 97
Three New Californian Arctostaphyli, *Willis Linn Jepson* ... 99
California Botanical Explorers.—XII, *Willis Linn Jepson* ... 102

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EMBRYONIC PANICLES IN ARCTOSTAPHYLOS

Willis Linn Jepson

In August and September, 1915, while studying the native shrubs on Howell Mountain in the Napa Range some attention was given to the chaparral slopes of the ridge locally known as Adam-and-Eve, an area repeatedly devastated by fire. Both *Arctostaphylos manzanita* and *Arctostaphylos stanfordiana* grow on this area. The two species have similarities: occasional individuals resemble each other in habit; their foliage is sometimes similar; both, it was readily determined at this spot, are killed outright by chaparral fires. The characters usually relied upon at that time for distinguishing them were, as in the case of nearly all characters used for differentiating Californian Arctostaphyli, unstable or broke down at some point. The panicles and flowers of these two species may not be readily distinguishable or distinguishable at all in herbarium specimens. The season of my work in 1915 on the Adam-and-Eve slope was just the opposite of the flowering season in January and February. It was, therefore, surprising to find young panicles structurally well-developed in embryo, in anticipation of the next flowering season. On account of their stage of development they were called embryonic panicles. The point of greatest interest lay in this, that although the flowering panicles of *Arctostaphylos stanfordiana* and *Arctostaphylos manzanita* are so similar, the embryonic panicles were found to be strikingly unlike. In the case of *Arctostaphylos stanfordiana* the embryonic panicle branches are slender, markedly erect and with very minute buds; in the case of *Arctostaphylos manzanita* the embryonic panicle branches are stouter, distinctly recurving and with more obvious buds. Were these characters inconstant or unstable like most of the characters used in differentiating species of *Arctostaphylos?* The question could not be answered off-hand. Record was made, on the spot, of the discovery in the usual way in the writer's field book as a base for further notation. Observations, always incidental to a broad pro-

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gramme of field work on the spermatophytes of California as a whole, were carried on for many years but not infrequently opportunities for adding notes to this category were overlooked or neglected, partly because needs as to various other groups were insistent, at other times because of lack of sufficient hours in a day. In the course of the years, however, a considerable body of records on the embryonic panicles of certain species was accumulated. Such observations favored the belief that the character of the embryonic panicle furnishes a differential for species that is of value and of greater value than most of the characters commonly employed in *Arctostaphylos.* The importance of the character naturally varies in different groups of the genus and in different species but it is plainly of marked importance in the case of *Arctostaphylos stanfordiana* and *Arctostaphylos manzanita.* Allied to these two is a narrow endemic of the region about Clear Lake in Lake County, *Arctostaphylos elegans.* The embryonic panicles in this species are different from either of the above species: they are coarse, minutely puberulent, consisting commonly of few or several simple branches, all of which, though erect and closely parallel, curve a little in one direction, that is, outward and downward. The bracts are short and broad, but nearly conceal the buds.

The embryonic panicles of *Arctostaphylos canescens* are stoutish, compact, curved, densely long-bracteate and white-pubescent. In *Arctostaphylos glandulosa* the branches of the embryonic panicle are few and curve a little; the bracts are not so congested as in *Arctostaphylos canescens* and tend to be abruptly contracted above the broad base which conceals the flower bud.

In the Sierra Nevada are two allied species which form a broad zone throughout the length of the upper foothills, *Arctostaphylos viscida* and *Arctostaphylos mariposa.* In the case of *Arctostaphylos viscida* the embryonic panicle is extremely small, consisting of one or two very short slender branches with acuminate bracts which almost completely hide the buds. The closely related *Arctostaphylos mariposa* exhibits similar embryonic panicles, the branches being a little stouter than in *Arctostaphylos viscida* and the bracts perhaps less acuminate.

The slight difference in the embryonic panicles of these two species is of especial significance because it reflects the weakness of other differences or presumed differences which have been used to sustain *Arctostaphylos mariposa* as a distinct species.

The most common species of the Sierra Nevada in the belt above *Arctostaphylos viscida* is *Arctostaphylos patula* which forms a broad band throughout that mountain chain, a band largely coincident with the distribution of Pinus ponderosa save on its lower borders. The panicle branches in this species are several, diverge a little, with the bracts distinctly spreading at right angles to the rachis as contrasted with the closely appressed bracts of both *Arctostaphylos viscida* and *Arctostaphylos mariposa.*

The period from January to May covers the flowering phase of most species. The embryonic panicles are, however, developed in the preceding June or July, sometimes at the end of May, and remain dormant six to eight months. It now seems probable that in all species of *Arctostaphylos* the embryonic panicles will be found to exhibit characteristics which are of importance taxonomically and possess either a positive value or a negative value. It is a source of character differential which could not have been predicted. Undoubtedly there are other elements in the field of the life history of these species awaiting discovery.

THREE NEW CALIFORNIAN ARCTOSTAPHYLI

WILLIS LINN JEPSON

In the course of the last eight years a large number of specimens of Arctostaphylos have been brought me for determination by Mr. A. E. Wieslander of the California Forest Experiment Station of the United States Forest Service. This material was collected by himself or by his assistants while engaged in the Forest Service field surveys connected with the preparation of the Type Map of the Woody Vegetation of California. This map project, now well begun and in part completed, is probably the most important large scale mapping of the woody cover of a region ever attempted for any country. The work is being done with a thoroughness, accuracy and attention to detail which makes the results extremely valuable, not only to the Forest Service, but also to botanists generally. The quadrangles already completed and published reflect great credit upon Mr. A. E. Wieslander, immediately in charge, and also on Mr. E. I. Kotok, the able Director of the California Forest Experiment Station, who has given the project sympathetic and appreciative support. One of the details of the work, testifying to the prudence, foresight and scientific interest of Mr. Wieslander, relates to the collection and preservation of herbarium specimens from every quadrangle in permanent validation of the results of the field work as shown on the finished maps. It was while engaged on such field detail that the workers of the survey collected the Arctostaphylos material which was brought to me. It seemed to me that for the purposes of the Survey it was necessary to give new names to certain forms. This was done from time to time. These names have been used in the field by the field men of the Survey for a number of years and also have been used by some botanists. It now seems desirable to make a formal record of three of these names, as covering proposals for three new species, with validating diagnoses. Since Mr. Wieslander's field observations as brought to me were of much value in coming to conclusions, it is my natural desire that his name should be associated with mine in publishing these new species names in Arctostaphylos. The diagnoses follow:

Arctostaphylos rudis Jepson & Wieslander sp. n. Shrub .6 to 1.2 m. high, with small leaves; branchlets dark, densely puberulent, the leaves minutely puberulent; leaf-blades oval to ovate, obtuse, apiculate, .8 to 1.6 (or 2.5) cm. long, on petioles 1 to 3 mm. long; flowers in short dense racemes 9 to 13 mm. long; pedicels glabrous; corolla pinkish; ovary glabrous; berry globose, 9 to 11 mm. wide, glabrous, smooth.—(Frutex .6 to 1.2 m. altus, parvifoliis; ramuli atri, puberulenti, foliis minutipuberulentis; foliorum lamina ovalis vel ovata, obtusa, apiculata, .8–1.6 (vel 2.5) cm. longa, petiolis 1–3 mm. longis; racemi densi, breves, 9–13 mm. longi; pedicelli glabri; corolla rosacea; ovarium glabrum; bacca drupacea globosa, glabra, 9–11 mm. lata.).—Sandhills near the coast in the Lompoc region of Santa Barbara County (type locality, Corralillos Cañon, type collected by *A. E. Wieslander* of the California Forest Experiment Station). Mr. Wieslander describes this species as being not only remarkable for its rough or fibrous bark but as crown-sprouting from strongly developed burls or woody enlargements at the base. In addition he brought to my laboratory from the field for my inspection well-formed burls developed on the branches of the shrub above the base.

Arctostaphylos silvicola Jepson & Wieslander sp. n. Shrub 1.5 to 2.1 m. high; branchlets dusky-pubescent and leaves minutely grayish-puberulent or glabrate; leaf-blades elliptic, obtuse, 1.5 to 3 cm. long, on petioles 3 mm. long; panicle with one to few branches; pedicels glabrous or nearly so; bracts foliaceous; corolla white; ovary glabrous; berry globose, slightly flattened, the nutlets distinct.—(Frutex 1.5–2.1 m. altus; ramuli atro-pubescentes; folia griseo-puberulenta, vel glabrata; foliorum lamina elliptica, obtusa, 1.5–3 cm. longa, petiolis 3–5 mm. longis; panicula pauci-ramosa; bracteae foliosae; corolla alba; ovarium glabrum; bacca drupacea globosa-depressa.)—Santa Cruz Mountains in the Mount Hermon region (type locality, near Felton Big Trees; type, a collection communicated by *A. E. Wieslander* of the California Forest Experiment Station). According to Mr. Wieslander this species does not crown-sprout and forms no woody platforms at base.

Arctostaphylos pilosula Jepson & Wieslander sp. n. Shrub 1.25 to 2.5 m. high; bark dark reddish-brown, polished; branchlets rather densely leafy, the branchlets and petioles pubescent and also with spreading bristles; leaf-blades elliptic to ovate, obtuse, mucronulate, lightly tomentulose (when young) to pubescent or at maturity subglabrate or glabrate, 2 to 3.3 (or 4) cm. long; panicle with few short branches, 1 to 1.8 cm. long; rachis puberulent and bristly; bracts puberulent and bristly-ciliate; pedicels glabrous; corolla white or nearly so; ovary glabrous; berry depressed-globose, glabrous, 6 to 8 mm.

wide.—(Frutex 1.25–2.5 m. altus; cortex brunneus, politus; ramuli foliacei, pubescentes atque hispidi; petioli pubescentes atque hispidi; foliorum lamina elliptica vel ovata, obtusa, mucronulata, tomentulosa vel pubescens, cum vetere subglabrata, vel glabrata, 2–3.3 (vel 4) cm. longa; panicula brevis, pauciramosa, 1–1.8 cm. longa; bracteae puberulentae atque hispidae; pedicilli glabri; corolla alba; ovarium glabrum; bacca drupacea depressa-globosa, glabra, 6–8 mm. lata.)—La Panza Range, San Luis Obispo Co. (type locality, American Cañon; type collected by *A. E. Wieslander* of the California Forest Experiment Station.) According to Mr. Wieslander the main stem or trunk forms no enlargement at the ground level.

CALIFORNIA BOTANICAL EXPLORERS.—XII

Willis Linn Jepson

John Milton Bigelow

The name of Bigelow is associated with many of the early discovered plant species of California. He was born at Peru, Bennington County, Vermont, on June 23, 1804. When eleven years old his family moved to Ohio where he went to the public schools and attended the Medical College of Ohio, at which institution he was graduated March 8, 1832. In 1850 he was appointed surgeon to the Mexican Boundary Commission. While on duty with the survey he collected and studied the native vegetation of the boundary and his specimens formed part of the material used by John Torrey in preparation of the Botany of the Mexican Boundary Survey (1859). His name is frequently cited in its pages. In 1853 Dr. Bigelow accepted the position of surgeon and botanist to the expedition of the Pacific Railroad Survey under Lieutenant A. W. Whipple, which left Fort Smith, Arkansas, and proceeded along the Canadian River and across the Llano Estacado to Albuquerque. The Rio Grande was crossed on November 10, 1853 and the expedition, following down the Bill Williams Fork, reached the Colorado River at the mouth of Williams Fork on February

28, 1854, ferried it about sixty miles above and traversed the Mohave Desert to the Cajon Pass, thence to Los Angeles and San Pedro. Here the survey of Lieutenant Whipple ended; but it was now the most favorable botanizing season in California and Dr. Bigelow in his own interest came north to San Francisco and Marin County to collect more fully the native vegetation of California. His zeal took him across the Great Valley into the Sierra Nevada where he remained until nearly June 1, 1854. He was not the first, but he was amongst the first explorers to botanize at all extensively in the Sierra Nevada mountains. Of his entire journey John Torrey said that "his ample collections," made in 1853 and 1854, "were brought home in perfect order," and adds: "A number of new genera and more than sixty new species have been discovered by Dr. Bigelow, and he has added much valuable information upon many heretofore imperfectly known plants."

In the course of the years the student of Californian botany needs to consult and study repeatedly the pages of volume four of the Pacific Railroad Reports where in about one hundred pages John Torrey has given an account of the Bigelow plants supplemented by thirty-five very fine lithographic engravings. In the citation of localities for California a number of extremely local place names occur which are not found on maps, and which have been difficult to place. One of these is Duffield's ranch, which is important as the collecting station for several Bigelow plants and especially as the type locality for Allium tribracteatum Torr. and other new forms.

To the systematic botanist whose initial or primary interest is in the living plant in its natural state, in its biology, ecological form and associates and habitat conditions, the type locality is vastly a more fruitful quest than the type specimens of early collectors which are frequently unsatisfactory, fragmentary or so decadent structurally as to be essentially useless. At the best the type specimen can usually do little more than enable one to make sure that a given binomial belongs to a particular unit; whereas the type locality opens up a new and living world whose potentialities may not be exhausted in years. It was for this reason, as well as for some uncertainties attaching to the identity of Allium tribracteatum, that I wished forty years ago to find Duffield ranch which is placed no more definitely in the text than " Sierra Nevada." The name could not be found on any available map or in any index and constant inquiry amongst pioneers failed in like manner. Resort was then had to a stratagem. I took such dates as are given in Torrey's paper, arranged them in chronological sequence with their localities and I thus made an itinerary for Bigelow. It was soon found that the dates were not always dependable but where the date agreed with the locality three times or more it was used in the list. In this manner I obtained the following chronology: From April 4 to April 12, he was in Oakland and the Oakland Hills; April 17 and 18 at Point Reyes; April 20 at Corte Madera; April 25 to 27 in Napa Valley; May 7 and 8, Stockton to Knights Ferry; May 9 at Sonora; May 10, 11, 12 at Duffield ranch; May 14, Carson's, Stanislaus River; May 14, Robinson Ferry, Stanislaus River, and Murphy's Camp; May 15, Washington Mammoth Grove (Calaveras Grove); May 17, Mokelumne Hill; May 18, Ione Valley; May 19 and 20, Grass Valley; May 21, Nevada City and Downieville; May 23, Middle Yuba River; May 25, Marysville and Marysville Buttes.

Having made this list it was a natural inference that Duffield ranch was somewhere between Sonora and the Stanislaus River or Murphy's Camp in Calaveras County. Any locality in this region was, however, too low in altitude for the species concerned, so that the inference seemed in some way fallacious.

No systematic effort had been made to find Duffield ranch but for two decades the query had been kept in mind and used on any likely prospect or as a sort of poser to the geographically minded. Now that, in 1916, I had made a Bigelow calendar, a wider appeal was made to local historians and editors of newspapers in the foothill towns, but the effort again proved unavailing.

To be continued